4.0 TRANSPORTATION IMPACTS

Chapter 2.0 described the transportation impacts of the No-Build Alternative, including future congestion as well as safety issues related to increased risk of crash incidents, increasing conflicts with rail traffic and increasing pedestrian/bicyclist conflicts as traffic volumes increase. These impacts establish the need for proposing an improved (Build) connection between I-94 and TH 10 in the study area. This chapter will focus on how well each of the four Build Alternatives addresses transportation issues identified in Chapter 2.0. The relationship or impact of the alternatives on other transportation-related issues such as intermodal relationships, energy use, and local and regional access changes is also discussed.

Since the Build Alternatives connect to I-94 and TH 10 at different locations along the highway corridors, each alternative has a different impact on what future improvements would be needed in those two corridors to meet the goals established in their respective IRC implementation plans (see Section 2.2). Therefore, the transportation impacts discussion also includes a discussion of I-94 and TH 10 system improvements needed (beyond the interchanges included in the DEIS Build Alternatives) to conform to their corridor goals.

4.1 FUTURE TRAFFIC OPERATIONS

Assessment of future traffic operations for the DEIS alternatives was performed using two analysis techniques: 1) forecast model-based volume/capacity comparison of the river crossing corridors in/adjacent to the study area; and 2) operations model-based analysis of the proposed Build Alternative crossings and the I-94 and TH 10 segments in the immediate vicinity of each proposed crossing. The operations model analysis was used to determine geometric requirements for the alternative connections and to identify potential capacity or operational issues. All analyses were performed using year 2040 traffic forecasts, to reflect conditions approximately 20 years beyond project completion (anticipated in 2019).

Build Alternatives A, B, C and D are relatively similar in that each provides a freeway connection between I-94 and TH 10. The main differences between alternatives include:

- general location along the I-94 and TH 10 corridors;
- interregional interchange geometrics; and
- location of local access interchanges (if any) on each interregional connection alternative.

Based on the recommendations of the I-94, TH 24/TH 10 and TH 10 IRC corridor studies conducted previously by Mn/DOT and its local transportation partners (see Section 2.2), the 2040 Build forecasting and operations analysis included planned corridor improvements to I-94 and TH 10. All four Build Alternative analyses assumed six lanes on I-94 from south of the study area to the location of the interregional connection and assumed TH 10 as a freeway from the interregional connection north through St. Cloud, with local access interchanges on TH 10 at locations identified in the TH 10 corridor study (or in the case of Alternative D, based on input from TAC representatives of local governments). These assumptions were used for both the forecast model-based and operations model-based analyses. Figures 4.1, 4.1-A, 4.1-B, 4.1-C, and 4.1-D show the regional system assumptions used for analysis of the No-Build Alternative and the Build Alternative A, B, C and D operations.

4.1.1 Forecast Model-Based Operations Analysis

Table 4.1 compares the 2040 forecast traffic volumes (daily screenline volumes) for the No-Build and four Build Alternatives for the river crossings in the vicinity of the study area. Table 4.2 shows the volume/capacity ratios (V/C) for each of these river crossings, based on the model analysis, with a V/C of 1.0 or greater indicating congested conditions. Table 4.3 shows the daily hours of congestion, based on forecast model analysis – indicating substantial decreases from No-Build for all Build Alternatives.

These results indicate that although all of the Build Alternatives serve approximately the same overall river crossing demand, the Build Alternatives vary in their ability to relieve other river crossings.

4.1.2 Operations Model-Based Analysis

In addition to the V/C based assessment of congestion described above, individual traffic operations models were run for each of the Build Alternatives, in order to assess operational function of each alternative in greater detail. The analysis used CORSIM freeway operations modeling software. Table 4.4 shows the results of the CORSIM mainline operational analysis for each of the Build Alternative connections between I-94 and TH 10 and the mainline operations on I-94 and TH 10 in the segments influenced by the Build Alternatives. (Note: Sub-Alternative A1 was also analyzed. The roadway configurations studied and the results of the analyses are included in a separate traffic operations technical memorandum, available upon request from the Mn/DOT Project Manager.)

4.1.2.1 2040 Operation on I-94/TH 10 Interregional Connection Alternatives

The analysis of the I-94/TH 10 Interregional Connection Build Alternatives summarized in Table 4.4 indicates that a number of mainline segments would operate at just below the LOS C/D threshold in 2040. Since LOS C is identified as the 'acceptable' level of service for highways in non-metro areas, the following additional capacity improvements may be needed for each of the Build Alternatives at the end of the analysis period, to maintain LOS C operations beyond year 2040.

- *Six lanes on the Alternative A connection from the I-94 interregional interchange to the CSAH 8 interchange.*
- *Six lanes on the Alternative B connection from the I-94 interregional interchange to CSAH 57 interchange.*
- *Six lanes on the Alternative C connection from I-94 to TH 10.* Alternative C shows mostly LOS C, but those LOS C segments are very close to the LOS D threshold (e.g., a density of 25.4 vehicles per lane per hour for the southbound segment versus 26 vehicles per lane per hour for the LOS D threshold).
- *Six lanes on the Alternative D connection from I-94 to TH 10.*

Figure 4.1

Figure 4.1-A

Figure 4.1-B

Figure 4.1-C

Figure 4.1-D

TABLE 4.1
DAILY SCREENLINE VOLUMES

Crossing	2000	2040 No-Build[1]	2040 Alternative A	2040 Alternative B	2040 Alternative C	2040 Alternative D
33rd Street	–	54,600	22,700	44,000	43,700	44,800
TH 24	13,200	34,500	23,300	–	15,100	20,300
TH 25	23,800	46,300	45,100	44,600	44,200	40,700
CSAH 42	6,600	7,400	6,500	6,100	6,400	5,700
TH 101	40,300	114,000	105,900	97,800	105,100	97,400
Interregional Connection	–	–	71,400	71,200	66,000	77,100

(1) No-Build 2040 assumes additional river crossing capacity due to construction of the planned 33rd Street and Dayton-Ramsey river crossings, as well as capacity improvements to TH 101, TH 10 and I-94.

TABLE 4.2
MAXIMUM/VOLUME — CAPACITY RATIOS

Crossing	2000	2040 No-Build[1]	2040 Alternative A	2040 Alternative B	2040 Alternative C	2040 Alternative D
33rd Street	–	1.8	1.0	1.5	1.5	1.5
TH 24	0.7	1.6	1.4	–	0.9	1.2
TH 25	1.2	1.8	1.7	1.7	1.7	1.6
CSAH 42	0.8	0.8	0.6	0.5	0.6	0.3
TH 101	1.8	1.4	1.3	1.3	1.3	1.3
Interregional Connection	–	–	1.0	1.1	0.9	1.0

[1] No-Build 2040 assumes additional river crossing capacity due to construction of the planned 33rd Street and Dayton-Ramsey river crossings, as well as capacity improvements to TH 101, TH 10 and I-94.

TABLE 4.3
DAILY HOURS OF CONGESTION

Crossing	2000	2040	2040	2040	2040	2040
		No-Build[1]	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
33rd Street	–	6	2	5	5	5
TH 24	–	7	3	–	<1	2
TH 25	7	9	9	9	9	9
CSAH 42	–	1	1	1	1	<1
TH 101	7	6	5	5	5	5
Interregional Connection	–	–	1	3	1	3

[1] No-Build 2040 assumes additional river crossing capacity due to construction of the planned 33rd Street and Dayton-Ramsey river crossings, as well as capacity improvements to TH 101, TH 10 and I-94.

TABLE 4.4
MAINLINE OPERATIONS LEVEL OF SERVICE

SEGMENT	ALTERNATIVE[(1), (2), (4)]											
I-94/TH 10 Connection	**Alternative A[(5)]**			**Alternative B**			**Alternative C**			**Alternative D**		
	LOS		**Lanes**	**LOS**		**Lanes**	**LOS**		**Lanes**	**LOS**		**Lanes**
	NB	**SB**		**NB**	**SB**		**NB**	**SB**		**NB**	**SB**	
North of I-94	D	C	4	D	D	4	C[(3)]	C[(3)]	4	D	D	4
I-94 to CSAH 8	D	C	4	D	D	4	C[(3)]	C[(3)]	4	D	D	4
CSAH 8 to TH 24	-	-		D	D	4	C[(3)]	C[(3)]	4	-	-	
TH 24 to CSAH 57	-	-		D	D	4	C	C	4	-	-	
CSAH 57 to TH 10	-	-		C	C	4	C	C	4	-	-	
South of TH 10	C	B	4	C	C	4	C	C	4	D	D	4

I-94 Mainline	ALTERNATIVE[(1), (2)]											
	Alternative A			**Alternative B5**			**Alternative C**			**Alternative D**		
	LOS		**Lanes**	**LOS**		**Lanes**	**LOS**		**Lanes**	**LOS**		**Lanes**
	EB	**WB**		**EB**	**WB**		**EB**	**WB**		**EB**	**WB**	
East of Alt D	***C***[(3)]	***C***[(3)]	***6***	***D***	***C***	***6***	***D***	***C***	***6***	D	D	6
Alt D to CSAH 8	***C***[(3)]	***C***[(3)]	***6***	D	C	6	D	D	6	D	D	4
CSAH 8 to Alt C	***C***[(3)]	***C***	***6***	D	C	6	D	D	6	D	C	4
Alt C to TH 24/Alt B	***C***[(3)]	***C***	***6***	D	C	6	D	C	4	***D***	***C***	***4***
TH 24/Alt B to Alt A	B/C	B/C	6	D	C	4	D	C	4	***D***	***C***	***4***
Alt A to CSAH 75 (E)	D	D	4	D	C	4	***D***	***C***	***4***	***D***	***C***	***4***
CSAH 75 (E) to CSAH 75	C	D	4	D	D	4	***D***	***D***	***4***	***D***	***D***	***4***
North of CSAH 75	C	C	4	***C***	***D***	***4***	***C***	**D**	***4***	***C***	***D***	***4***

TH 10 Mainline	ALTERNATIVE[(1), (2), (4)]											
	Alternative A			**Alternative B5**			**Alternative C**			**Alternative D**		
	LOS		**Lanes**	**LOS**		**Lanes**	**LOS**		**Lanes**	**LOS**		**Lanes**
	EB	**WB**		**EB**	**WB**		**EB**	**WB**		**EB**	**WB**	
North of CSAH 7	D	D	4	***D***	***D***	***4***	***D***	***D***	***4***	***D***	***D***	***4***
CSAH 7 to Alt A	C	E	4	***D***	***D***	***4***	***D***	***D***	***4***	***D***	***D***	***4***
Alt A to CR 65	B	B	4	***D***	***C***	***4***	***C***	***C***	***4***	***D***	***C***	***4***
CR 65 to CSAH 16/CR 60	B	B	4	D	C	4	D	C	4	***D***	***C***	***4***
CSAH 16/CR 60 to Alt B/C	N/A	N/A		D	C	4	C	C	4	***C***	***C***	***4***
Alt B/C to TH 24	N/A	N/A		C	B	4	B	B	4	***C***	***C***	***4***
TH 24 to CSAH 55	N/A	N/A		N/A	N/A		N/A	N/A		D	D	4
CSAH 55 to Alt D	N/A	N/A		N/A	N/A		N/A	N/A		C	C	4
East of Alt D	N/A	N/A		N/A	N/A		N/A	N/A		B	B	4

(1) The LOS in ***bold and italic*** type is based on a planning level analysis.
(2) The LOS in standard type is based on CORSIM analysis.
(3) The density or v/c ratio for this segment is very close to the LOS D threshold (e.g., a v/c of 0.74 for a segment vs. a v/c of 0.75 for the LOS D threshold).
(4) N/A = LOS not analyzed for expressway segments.
(5) Analysis for Alternative A assumed construction of the local access interchange at CSAH 8, as a "worst case" condition. However, construction of the local interchange is not proposed for construction as part of the I-94/TH 10 Interregional Connection project (see discussion in Section 3.2.2.1).

(Note: The operations analyses described in this section—many of which indicated operations at/near the LOS C/D threshold—were based on forecast traffic volumes for 40 years into the future, which have some margin of error in predicting actual conditions. Therefore, additional analysis performed at a time closer to project implementation would be a more reliable predictor of the improvements needed within the implementation planning period than the current analysis for 2040 conditions. As a result, the additional improvements described as potentially being needed to provide LOS C operations in 2040 were not incorporated into a revised DEIS operations analysis or into the proposed Build Alternative design concepts.)

4.1.2.2 Interim Analysis for Alternative D Connection

Since the TH 25 connection at TH 10 adds a substantial additional cost to the I-94/TH 10 project, there is a possibility that the TH 25 connection may need to be excluded from the initial I-94/TH 10 Interregional Connection construction if Alternative D is chosen as the preferred alternative, and built at a later date when there is an operational need for the connection. An 'interim' condition operations scenario was also analyzed (i.e., with the new Alternative D interregional connection interchange at TH 10) but without the interchange ramps and roadways connecting to TH 25. The results of that analysis indicate that acceptable operations can be maintained without the TH 25 interchange connection until approximately year 2028.

4.1.2.3 2040 Operations on I-94 and TH 10

CORSIM operations analyses included assessment of whether the proposed Build Alternatives would adversely affect operations on I-94 and/or TH 10. The operations technical memorandum includes detailed information on the results of this analysis which indicate that the Build Alternatives would generally maintain LOS D or better merge/diverge junctions, weave areas and mainline sections on I-94 and TH 10 within the area of influence of each proposed new crossing (i.e., one interchange beyond each proposed crossing alternative location). Only four locations were identified in the CORSIM analysis as potential problem areas (i.e., at LOS E) that would require additional analysis and design of improvements to be constructed to prevent operational problems by year 2040:

1) Alternative A at the CSAH 75 East/I-94 eastbound entrance ramp (merge). This merge was projected to experience LOS E operations in the p.m. peak hour.

2) Alternative A at the CSAH 7/TH 10 eastbound entrance ramp (merge) where the merge junction was projected to experience LOS E operations in the p.m. peak hour.

3) Alternative B at the CSAH 75 East/I-94 westbound entrance ramp (merge). This merge was projected to experience LOS E operations in the p.m. peak hour.

4) Alternative D at the I-94 eastbound mainline between the CSAH 8 exit ramp and CSAH 8 entrance ramp, where both the mainline and the merge junction have a LOS E in the p.m. peak hour.

4.2 IMPACT ON NEEDED I-94 AND TH 10 REGIONAL SYSTEM IMPROVEMENTS

As described in Chapter 2.0, IRC management/improvement plans have been prepared for the I-94 and TH 10 corridors in the study area. The improvements to these corridors identified in the IRC plans have been included in the forecast and operations modeling for the DEIS analyses. These plans indicated that I-94 is planned to be converted to a six-lane facility from the TH 25 interchange up to the location of the I-94/TH 10 Interregional Connection. The TH 10 corridor would be converted to a four-lane freeway from the I-94/TH 10 Interregional Connection through St. Cloud. Thus, even though the I-94 and TH 10 corridor plans indicate concepts envisioned for those IRC corridors, the I-94/TH 10 Interregional Connection Build Alternatives would each result in different needed improvements to I-94 and TH 10 (see Figures 4.1-A, 4.1-B, 4.1-C and 4.1-D), resulting in different system construction costs and environmental impacts.

Chapter 10.0 of this DEIS (Secondary Impacts) includes a discussion of the relative environmental impacts of the I-94/TH 10 system improvements for each alternative (No-Build and Build). The system improvement construction costs would also be 'secondary' to the costs for construction of each of the four Build Alternatives (identified in Section 3.2), since they would be implemented as independent improvement projects for the I-94 and TH 10 corridors. However, since these regional system costs will vary among DEIS alternatives, an estimate of the relative costs for regional system improvements was made to allow for comparison of overall system costs among alternatives. Table 4.5 summarizes the regional system costs for each alternative, including the construction cost of each I-94/TH 10 Interregional Connection alternative.

TABLE 4.5
REGIONAL SYSTEM CONSTRUCTION COSTS

	No-Build	Alternative A	Alternative B	Alternative C	Alternative D
Estimated cost of Regional System Improvements (construction and right of way[1])	$96,126,000	$88,799,000	$96,526,000	$93,399,000	$110,472,000
Total Cost of Regional System plus Interregional Connection (construction and right of way)	$104,126,000	$195,258,000	$204,503,000	$198,580,000	$223,160,000

[1]Does not include construction or right of way costs for the I-94/TH 10 Interregional Connection.

It should be noted that the results of the CORSIM analysis for mainline levels of service on freeway segments of I-94 and TH 10 for Alternatives A, B, C and D indicate that a number of segments on I-94 and TH 10 would be just below the LOS C/D threshold in 2040. Since LOS C is identified as the 'acceptable' level of service for rural roadways, the CORSIM analysis was supplemented with a planning-level volume to capacity comparison for the freeway segments not analyzed in CORSIM for each alternative (i.e., generally the segments include more than one interchange beyond the proposed interregional connection interchange) to see the extent of

LOS C/D threshold conditions on the I-94 and TH 10 corridors. This helps assess the potential need for planning additional lane capacity to achieve LOS C operations on I-94 and TH 10. The results of the planning-level analysis are indicated in ***bold italics*** in Table 4.4, while the CORSIM results are in standard type.

The mainline LOS results indicate that if LOS C is the operational goal for the I-94 and TH 10 and interregional connection corridors, then segments on I-94 and TH 10 may need the following beyond the 2040 timeframe:

- Eight lanes on I-94 east of each new interregional interchange.
- Six lanes on I-94 from west of each interregional connection to the existing CSAH 75 interchange in St. Cloud.
- Six lanes on TH 10 west of each interregional interchange through St. Cloud.

The additional system improvements described above as potentially being needed to provide LOS C system operations in 2040 were not incorporated into a revised DEIS operations analysis for two reasons: 1) the I-94 and TH 10 system improvements would result in essentially the same additional implementation costs so they would not be an influence in identifying a preferred alternative among the DEIS alternatives, and 2) since the operations analysis were based on forecast figures for 40 years into the future, which have some margin of error in predicting actual conditions, additional analysis performed at a time closer to project implementation should be used as a more reliable predictor of the improvements needed within the implementation planning period.

4.3 SAFETY

4.3.1 Highway Safety

All four Build Alternatives would result in improved safety compared to the No-Build Alternative since each Build Alternative would provide a freeway connection between I-94 and TH 10 and freeways have lower crash rates than two-lane or four-lane at-grade roadways (e.g., existing TH 24 corridor for the No-Build Alternative). Alternative B would convert existing TH 24 to a freeway, increasing safety in that corridor (albeit at the expense of local access).

If safety is considered on a system-wide basis (i.e., beyond the safety benefits of the I-94/TH 10 Interregional Connection alone), Alternative D would result in the greatest overall safety improvement, since the greatest length of TH 10 would be converted from an expressway to a freeway as part of overall system improvements. Similarly, Alternatives B and C would generate greater safety benefits than Alternative A for the same reasons as noted for Alternative D above.

4.3.2 Railroad Crossing Safety and Congestion

All Build Alternatives provide a grade-separated interregional crossing over the BNSF Railroad line located parallel to TH 10. Moving the interregional traffic to the grade-separated crossing increases safety by decreasing the total number of vehicles at existing at-grade crossings where train/car collisions could occur. The grade-separation also eliminates the delay and resulting congestion for interregional system travelers when a train passes through and pre-empts traffic operations at at-grade intersections.

4.3.3 Local TH 24 Safety

Local safety considerations along Old TH 24 include pedestrian/bicyclist issues in downtown Clearwater and Clear Lake, farm equipment and snowmobile crossings on the narrow river bridge, and school safety issues. In addition, there are concerns at the Sherburne County CSAH 8 intersection (signal proposed). This intersection will continue to have limited gaps available during peak hours for side street flows. Under Alternatives A, C and D, higher speed interregional traffic would be shifted to the new crossing location, thereby improving safety in the current TH 24 corridor over the No-Build Alternative. Existing TH 24 would continue to serve as a local river crossing link to Clearwater and Clear Lake. It is assumed that the narrow Old TH 24 river crossing bridge would be replaced under these three Build Alternatives with a new structure that would be better equipped to handle pedestrian and other modes. While traffic levels on TH 24 under these three alternatives are anticipated to exceed today's volumes, it is anticipated that safety issues could be better addressed than they are today, because the types of solutions would not have to accommodate the long interregional trips (e.g., stop lights and urbanization of the corridor could be pursued and would be consistent with the function of the corridor).

Alternative B provides challenges to bicycle and pedestrian activities in Clearwater. The current TH 24 facility would be converted to a grade-separated facility, thus safer, but the configuration would limit access to the rest of the community (require vehicles, bicycles and pedestrians to go greater distances to cross TH 24 and/or to get south of I-94). This alternative would provide the greatest reduction in traffic volumes (local and regional) on Old TH 24 in Clear Lake, minimizing potential school, farm, snowmobile and downtown Clear Lake traffic conflicts. Separate river crossing accommodations would need to be provided for non-vehicular traffic for Alternative B, since the Old TH 24 bridge would not exist as a separate local crossing. Slow-moving farm vehicles may still be a safety issue for Alternative B, if the crossing continues to be used by farm traffic.

4.3.4 Alternative D Special Safety Study – Icing/Fog Issues

Alternative D is located approximately 0.5 mile west of Xcel Energy's Sherburne County (SHERCO) power generation plant. The evaporative cooling towers at the SHERCO plant dissipate waste heat from the circulating water systems used to condense steam, discharging saturated air and liquid water droplets to the atmosphere. During the DEIS scoping process, concern was raised that the cooling tower emissions could be a safety issue for Alternative D since the saturated air could increase the possibility of localized fog if the plumes contact the ground and fallout of water droplets or ice crystals from elevated plumes. These cooling tower impacts are more likely in cold weather situations, which can occur frequently during Minnesota winters. Because of the historical awareness of potential microclimate impacts, SHERCO maintains an automated system to alert plant personnel to possible impacts. An atmospheric conditions alarm notifies the plant when wind, temperature and humidity conditions are such that effects on existing roads are possible. When incidents do occur they typically persist for one hour or less, and do not cause accumulations sufficient to create a traffic hazard.

A meteorology study evaluating the potential impacts of the SHERCO cooling towers on the Alternative D river crossing was conducted by a certified consulting meteorologist as part of the DEIS studies. Extensive modeling analyses of potential cooling tower impacts were carried out during permitting of the third generating unit at SHERCO (*SHERCO 3 Final Environmental Supplement*, 1981). These studies were done in response to concerns about possible impacts on TH 10, where occasional moisture plumes had been observed from the original two SHERCO generating units. The results of the 1981 analyses have been used, along with updated climatological statistics and historical experience, to evaluate the potential for meteorological impacts on the Alternative D river crossing route.

The results of the meteorology study identified a very low likelihood for fog on the Alternative D river crossing bridge (less than one occurrence per year) and it is not expected that the cooling towers would, in fact, ever cause fog along the highway route. The only impact that should be expected is the rare occurrence (on the order of one to three times per year) of very light snowfall resulting from fallout of ice crystals from an elevated plume. Experience at many cooling tower facilities in locations with low winter temperatures, such as Minnesota, indicate that fog formation and icing due to drift fallout do not occur beyond approximately 1,000 feet from the towers. The closest proximity of Alternative D to the SHERCO cooling towers is several times this distance and the Alternative D river crossing bridge is located 2,800 feet northwest of the SHERCO 3 cooling tower.

4.4 VEHICLE MILES TRAVELED (VMT) / VEHICLE HOURS TRAVELED (VHT)

The regional forecast model was used to calculate the impact of each alternative on two measures of the total amount of driving activity that occurs in the region: vehicle miles traveled (VMT) and vehicle hours traveled (VHT). Increasing accessibility (e.g., through the construction of a new river crossing) can reduce VMT by allowing trips to be, on average, shorter, either through a decreased need for diversion from a congested crossing or by improved accessibility to a developed area that is not currently well served by the transportation system. Relieving congestion reduces VHT by reducing the time required to make an average trip. The regional (total) VMT and VHT data for each alternative (and the difference compared to the No-Build Alternative) are presented in Table 4.6.

TABLE 4.6
TOTAL VMT/VHT PER DAY (YEAR 2040)

	No-Build	Alt A	Alt B	Alt C	Alt D
Total VMT	110,185,130	110,326,870	110,386,290	110,028,690	110,240,510
Difference from No-Build	N/A	141,740	201,160	-156,440	55,380
Total VHT	3,507,000	3,506,760	3,506,750	3,486,340	3,493,640
Difference from No-Build	N/A	-240	-250	-20,660	-13,360

Note: The total VMT and VHT values in this table include the entire forecast modeling area, including the St. Cloud and Twin Cities metropolitan areas and the TH 10 and I-94 travelshed areas included in the forecast model for this study.

Alternative C is the only alternative that results in a reduction in VMT. Alternative C and Alternative D were better than Alternatives A and B at reducing the VHT.

4.5 BENEFIT/COST ANALYSIS

A benefit-cost analysis was completed for the proposed I-94/TH 10 Interregional Connection project. A detailed description of the benefit-cost analysis and methodology is included in the *Benefit-Cost Analysis Memorandum* prepared for this project, available upon request from the Mn/DOT Project Manager.

The objective of a benefit-cost analysis is to bring all of the direct effects of a transportation investment into a common measure (dollars), and to allow for the fact that benefits accrue over a long period of time while costs are incurred primarily in the initial years. Benefit-cost assesses the potential benefits and costs of each of the four Build Alternatives when compared to the No-Build condition. The primary elements that can be monetized are travel time (based on vehicle hours traveled or VHT), changes in vehicle operating costs (based on vehicle miles traveled or VMT), vehicle crashes and remaining capital value. The benefit-cost analysis can provide an indication of the economic desirability of an alternative, but decision-makers must weigh the results against other considerations, effects, and impacts of the project. A benefit-cost ratio of 1.0 is generally considered the minimum for justifying an improvement. The larger the ratio number, the greater the benefits per unit cost.

The results of the benefit-cost analysis indicate that Alternative A would have a benefit-cost ratio of 7.8, Alternative B would have a benefit-cost ratio of 6.3, Alternative C would have a benefit-cost ratio of 26.5, and Alternative D would have a benefit-cost ratio of 13.4.

4.6 LOCAL AND REGIONAL TRANSPORTATION SYSTEM ACCESS CHANGES

Construction of any of the Build Alternative river crossings would result in changes in local road access to the regional system and in changes in individual property access to local or regional roadways. The local effects of these changes to communities and to individual properties are described in detail in Section 5.1.2.1 (Community Cohesion). Chapter 10 (Secondary Impacts) describes the secondary impacts of changes in access to and across TH 10 as a result of implementation of conversion of TH 10 to a freeway, in conformance with IRC plans, for each alternative.

This section will focus on general impacts to transportation system continuity from each Build Alternative as a result of access changes. The No-Build Alternative would not physically affect the access points to/from the interregional system, but delays and operational problems for both interregional and local traffic (and the number of hours per day that congestion occurs) in Clearwater and Clear Lake would likely continue to increase in the future.

All Build Alternatives would provide grade-separation at all county roads that intersect each new alignment, and therefore would not affect local system continuity for important local through movements. At locations where access to local roads and individual properties was severed, mitigation provided alternative means of accessing local roadways and/or the interregional system.

Loss of access from downtown Clearwater to the interregional system in Alternative B would be mitigated by providing grade separation at CSAH 75/Alternative B and an overpass across I-94, east of the downtown area, connecting to the TH 24 access to the south of I-94. However, this mitigation adds considerable circuity to trips from downtown destined for the interregional system and for 'local' trips from downtown to destinations just across the river (e.g., school, Clear Lake, emergency service, farm vehicles).

Loss of access from Clear Lake to the interregional connection for Alternatives B and C is mitigated by providing a local access interchange north of the river on Old TH 24. Clear Lake also continues to have access to TH 10 via a signal at Old TH 24/TH 10 for Alternatives B and C. Alternative C would maintain the existing TH 24 connection between Clearwater and Clear Lake.

Alternative D system concept (see Figure 4.1-D) would have a secondary impact (see Chapter 10.0) that would result in loss of direct access from Clear Lake to the interregional system (intersection would be removed and underpass provided to maintain local through movements across TH 10). Interregional connectivity impacts could be mitigated by providing access to the proposed interchanges on TH 10 from Clear Lake via a system of parallel frontage roads, although this would increase circuity for some trips.

4.7 VEHICULAR ENERGY USE

Roadway projects consume energy both directly and indirectly. Direct energy impacts are defined as the fuel that would be used by vehicles traveling the roadway as well as fuel that would be consumed by vehicles using alternate routes during congested periods in lieu of the roadway under study. Thus, the primary direct impacts on transportation energy use related to the proposed project would result from changes in traffic volumes and traffic patterns associated with project Build and No-Build Alternatives. Indirect impacts are defined as the fuel required to construct and maintain the road, and the fuel used to construct and maintain the vehicles using the roadway.

Energy consumption models commonly used for analysis of energy impacts can typically predict energy impacts within a margin of error of approximately 10 percent. Therefore, differences in energy use of less than 10 percent among alternatives are not considered to be substantial. A preliminary assessment of total energy differences among alternatives, based on a comparison of total VMT as a primary predictor of differences in highway use energy consumption, indicated differences of less than 10 percent among all alternatives. The difference between the No-Build and each of the four Build Alternatives is less than one percent. (A discussion of values for No-Build and Build Alternatives' total VMT is provided in Section 4.4.) The difference in VMT for the four Build Alternatives is less than one percent. Therefore, a detailed energy analysis (using modeling) was not performed for this project.

All of the Build Alternatives would involve roadway construction and thus would result in construction-related energy use. The No-Build Alternative would consume less indirect energy than any other alternative because no initial construction is required; however, periodic roadway maintenance, such as resurfacing, would occur over time.

Operational energy consumed under Alternative C is expected to be less than the No-Build because the VMT is less. Operational energy consumed may increase with Alternatives A, B, and D because the VMT is greater.

4.8 OTHER MODES

4.8.1 Freight Rail

None of the alternatives would negatively impact operation of the BNSF freight rail line that crosses each interregional connection corridor just south of TH 10. As described in Section 4.3.2, the Build Alternatives would all remove interregional traffic from the existing TH 24 at-grade rail crossing, reducing train-auto crash exposure levels compared to No-Build conditions.

4.8.2 Commuter Rail

The North Star Commuter Rail corridor is proposed to share the BNSF freight rail corridor. None of the alternatives would negatively impact the potential use of this corridor for future commuter rail or would preclude construction of the commuter rail stations identified in the most recent corridor concept plan. Concept plans for the North Star Commuter Rail corridor indicate possible stations in Becker, Clear Lake and St. Cloud. None of the proposed DEIS alternatives would negatively impact plans for the North Star Commuter Rail corridor. As noted in Section 4.3.2, the Build Alternatives would all remove interregional traffic from the existing TH 24 at-grade rail crossing, reducing commuter train-auto crash exposure levels compared to No-Build conditions.

4.8.3 Pedestrian, Bicycle and Snowmobile Traffic

Section 4.3.3 describes safety and access issues related to pedestrian, bicycle and snowmobile traffic in the vicinity of Clearwater and Clear Lake (the main origins/destinations for these modes) for the Build and No-Build Alternatives. Section 6.8 describes trails located in the study area as well as potential impacts and mitigation for the Build Alternatives. Although no trail corridors are currently designated across the Mississippi River corridor in the vicinity of the proposed Build Alternatives, multi-modal transportation planning encourages provision of alternative modal crossings when major river crossings are constructed. The designation of the Mississippi River as a Scenic Riverway increases the potential need for accommodation of pedestrians, bicyclists and other recreational traffic modes. Therefore, the need to facilitate pedestrian, bicycle and snowmobile crossing will be reviewed for the identified preferred Build Alternative design concept in the future, closer to project construction, to assess the needs at that time.

4.8.4 Public Transit

Public transit in the study area is currently limited to flexible fixed route and dial-a-ride service in some portions of the study area. As development continues to increase in the study area in the future, the public transit system will likely be expanded to increase coverage. The Build Alternatives would all decrease congestion on river crossing corridors within the study area, decreasing future transit service delays compared to the No-Build Alternative.